AMENDMENTS TO THE CLAIMS

The listing of claims will replace all prior versions, and listings, of claims in the application.

1-18. (Canceled)

19. (Previously Presented) A method of forming a membrane structure for use in a device to characterize polymer molecules, comprising:

providing a support substrate of a predetermined material;
depositing a thin film on the support substrate;
etching a hole through the support substrate that removes all of the material in a predetermined area so that the thin film is self supporting over the predetermined area;
electron beam milling a nano-scale channel entirely through a self supporting portion of the thin film; and
measuring the channel in-situ,
wherein the milling and measuring are performed during a single presentation to an instrument.

20. (Previously Presented) The method of claim 19, wherein the act of milling comprises using a TEM instrument.

21-23. (Canceled)

24. (Original) The method of claim 19 wherein the channel has dimensions that allow passage of polymer molecules therethrough so that as a polymer molecule passes therethrough a given monomer will cause a detectable change in the thin film wherein the detectable change will characterize the monomer.

25. (Original) The method of claim 19 wherein the channel has a diameter of 2-5 nm.

26. (Original) The method of claim 25 wherein the thin film has a thickness of about 30 nm or less.

27. (Original) The method of claim 19 wherein the support substrate is silicon.

28. (Previously Presented) The method of claim 19 wherein depositing the thin film further includes:

providing a layer of electrically conductive material having a predetermined pattern such that milling the channel separates the layer into a plurality of independent conductive leads.

29. (Original) The method of claim 28 wherein two conductive leads are formed.

30. (Original) The method of claim 28 wherein four conductive leads are formed.

31. (Previously Presented) The method of claim 19 wherein depositing the thin film further includes:

providing a layer of electrically conductive material having a predetermined pattern; and

removing a predetermined amount of the layer of electrically conductive material so that when the channel is milled, the remainder of the layer of electrically conductive material is separated into a plurality of conductive leads.

32. (Original) The method of claim 31 wherein two conductive leads are formed.

33. (Original) The method of claim 31 wherein four conductive leads are formed.

34. (Previously Presented) The method of claim 19 wherein depositing the thin film further includes:

providing a first layer of electrically conductive material having a predetermined pattern such that milling the channel separates the layer into a plurality of independent conductive leads;

providing a layer of a dielectric material over the first layer of electrically conductive material;

providing a second layer of electrically conductive material having a predetermined pattern such that milling the channel separates the layer into a plurality of independent conductive leads, wherein the second layer of electrically conductive material is provided such that the dielectric material separates the second layer of electrically conductive material from the first layer of electrically conductive material.

35. (Original) The method of claim 34 wherein two conductive leads are formed in the first layer and two conductive leads are formed in the second layer.

36. (Original) The method of claim 34 wherein four conductive leads are formed in the first layer and four conductive leads are formed in the second layer.

37. (Previously Presented) The method of claim 19 wherein depositing the thin film further includes:

providing a first layer of electrically conductive material having a predetermined pattern;

removing a predetermined amount of the first layer of electrically conductive material so that when the channel is milled, the remainder of the first layer of electrically conductive material is separated into a plurality of conductive leads;

providing a layer of dielectric material;

providing a second layer of electrically conductive material having a predetermined pattern, where the dielectric material separates the first layer of electrically conductive material from the second layer of electrically conductive material; and

removing a predetermined amount of the second layer of electrically conductive material so that when the channel is milled, the remainder of the second layer of electrically conductive material is separated into a plurality of conductive leads.

38. (Original) The method of claim 37 wherein a focused ion beam is used to remove the predetermined amount of the electrically conductive layer from the first layer and from the second layer.

39. (Original) The method of claim 37 wherein two conductive leads are formed in the first layer and two conductive leads are formed in the second layer.

40. (Original) The method of claim 37 wherein four conductive leads are formed in the first layer and four conductive leads are formed in the second layer.

41. (Original) The method of claim 19 wherein depositing the thin film further includes:

providing a first layer of electrically conductive material;

providing a layer of dielectric material;

providing a second layer of electrically conductive material such that the layer of dielectric material separates the first layer of electrically conductive material from the second layer of electrically conductive material and the channel passes through the first layer of electrically conductive material, the dielectric material and the second layer of electrically conductive material.

42. (Original) The method of claim 19 wherein etching the hole includes using lithography.

43-44. (Canceled)

45. (Previously Presented) The method of claim 19, further comprising gathering molecular information from the measuring step.

46. (Previously Presented) The method of claim 19, wherein the nano-scale channel has substantially vertical side walls.